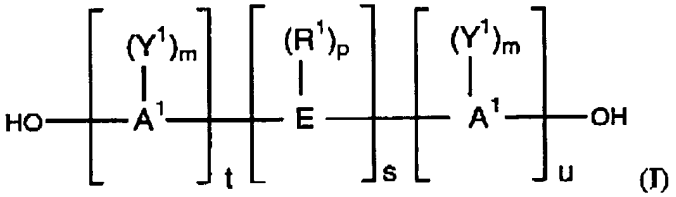
REMARKS

In the Office Action of October 17, 2005, claims 1, 4-7, 11-17, and 19-20 were rejected. In this response, claims 1, 5, 11, and 12 have been amended, and claim 20 has been cancelled. Claims 1, 4-7, 11-17 and 19 remain pending in the application.

Rejection Under 35 U.S.C § 112, Second Paragraph

In the Office Action of October 17, 2005 the Examiner rejected claim 5 as indefinite under 35 U.S.C. 112, second paragraph. The Examiner noted that the variables "s", "t" and "u" shown in structure (I)



(I)

were undefined in claim 5, although the variables were defined in the specification at paragraph 12. In response the Applicants have amended claim 5 to include definitions for the variables "s", "t" and "u". No new matter has been added. In view of the amendment to claim 5 the Applicants respectfully request that the rejection of claim 5 under 35 U.S.C. 112 , second paragraph, be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 4-7, 11-17, 19-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4,814,419 (hereinafter referred to as "the Cotter reference"). Further, claim 6 was rejected under 35 U.S.C. 102(a) as being unpatentable over the Cotter reference in view of Fukuyama, U.S. Patent No. 4,959,454. As noted above, the Applicants request that claim 20 be cancelled. Thus, only claims 1, 4-7, 11-17 and 19 remain pending in the application. In this submission, claim 1 has been amended to more clearly set forth the invention as embodied in the Applicants' experimental data presented in Table. Claims 11 and 12 have been amended to render them with greater clarity.

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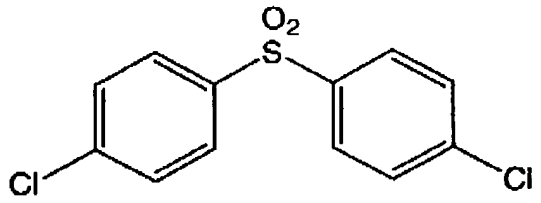
The rejection of claims 1, 4-7, 11-17, 19-20 under 35 U.S.C. 103(a) as being unpatentable over the Cotter reference or Cotter in view of Fukuyama is respectfully traversed. The Cotter reference discloses a genus of polyethersulfone compositions comprising structural units derived from 4,4'-biphenol and bisphenol A and a bishalophenyl sulfone. Thus, at column 3, lines 19-55 the Cotter reference discloses generic polyethersulfone compositions comprising structural units derived from the bishalophenyl sulfone 4,4'-dichlorodiphenyl sulfone (3) (See column 3, line 30)



(3)

and mixtures of 4,4'-biphenol and bisphenol A containing from about 50 to about 90 mole percent 4,4'-biphenol (See column 3, lines 55-57). Further, the Cotter reference discloses specific polyethersulfone compositions comprising structural units derived from 4,4'-dichlorodiphenyl sulfone (3), 4,4'-biphenol, and bisphenol A (See Experimental Example 2, column 9, lines 35-68) and Table 2. The Applicants wish to highlight the polyethersulfone composition comprising structural units derived from 4,4'-biphenol and bisphenol A in a 75:25 molar ratio. The polyethersulfone composition comprising structural units derived from 4,4'-biphenol and bisphenol A in a 75:25 molar ratio disclosed in the Cotter reference (Table 2) does not fall within the scope of the instant invention because the weight average molecular weight of the disclosed polyethersulfone composition is below 54,000 grams per mole as is revealed by the low glass transition temperature (205°C) reported for this composition in Table 2. While the Cotter reference does not disclose expressly the weight average molecular weights of any of the polyethersulfone compositions disclosed in Table 2, the molecular weight of the polyethersulfone composition comprising structural units derived from 4,4'-biphenol and bisphenol A in a 75:25 molar ratio can be estimated by those skilled in the art from its glass transition temperature of 205°C and the glass transition temperatures and molecular weights for similarly constituted polyethersulfone compositions presented in Table 1 of

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the instant application. It is estimated that a polyethersulfone composition consisting of structural units derived from a 4,4'-dichlorodiphenyl sulfone, 4,4'-biphenol and bisphenol A wherein the structural units derived from 4,4'-biphenol and bisphenol A are present in a 75:25 molar ratio (i.e. the example of Table 2 of the Cotter reference) and having a glass transition temperature of 205°C will have a weight average molecular weight of less than about 48,000 grams per mole. As supported by the Applicants' experimental data, such a polyethersulfone compositions will fail to exhibit outstanding Notched Izod impact strength values because the composition has a weight average molecular weight of less than 54,000 grams per mole.

It is the Applicants' position that the Cotter reference neither discloses nor suggests the existence of a subgenus of polyethersulfone compositions comprising structural units derived from 4,4'-biphenol and bisphenol A having outstanding physical properties as a result of a unique combination of structural units (the relative amounts of 4,4'-biphenol and bisphenol A derived structural units) and molecular weight. Moreover, no species of polyethersulfone composition disclosed in the Cotter reference belongs to such a subgenus. The subgenus of polyethersulfone compositions which form the basis of the instant invention is set forth clearly in amended claim 1 as presented herein.

As set forth in currently amended claim 1, the Applicants have discovered a unique group of polyethersulfone compositions comprising structural units derived from bisphenol-A and 4,4'-biphenol, said 4,4'-biphenol structural units being present in an amount corresponding to greater than 65 mole percent based on total moles of structural units derived from diphenolic monomers, wherein the polyethersulfone has a minimum weight average molecular weight of 54,000 grams per mole as measured by gel permeation chromatography. Polyethersulfone compositions falling within the subgenus bounded by these limitations on composition and molecular weight have been found unexpectedly to exhibit Notched Izod impact strength values of greater than 700 Joules per meter as measured by ASTM D256.

The experimental data contained in the application as filed fully supports each and every limitation of currently amended claim 1. Thus, Examples 1-3 (Ex. 1 to Ex. 3)

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illustrate embodiments of the present invention wherein the polyethersulfone composition comprises structural units derived from bisphenol-A and greater than 65 mole percent of 4,4'-biphenol based on total moles of diphenolic monomers, wherein the polyethersulfone has a minimum weight average molecular weight (M_w) of 54,000 grams per mole as measured by gel permeation chromatography. Each of the compositions of Examples 1-3 exhibits a Notched Izod impact strength value of greater than 700 Joules per meter as measured by ASTM 256. It should be noted that for polyethersulfone compositions of the claimed invention, the experimental data of Table 1 reveal that when the weight average molecular weight (M_w) of a polyethersulfone composition is 54,000 grams per mole or higher as determined by gel permeation chromatography, the Notched Izod impact strength is greater than 700 Joules per meter. The Applicants' data reveal the surprising combined effect of molecular weight and of the relative amounts of structural units derived from 4,4'-biphenol and structural units derived from bisphenol A on the properties of the product polyethersulfone. Each of the polyethersulfones of Examples 1-3 shows outstanding performance in the Notched Izod test, each of Examples 1-3 outperforming the polyethersulfone composition of Comparative Example-2, a commercially available polyethersulfone composition exhibiting high impact strength as measured by ASTM 256.

The polyethersulfone composition of Comparative Example-2 comprises structural units derived from 4,4'-biphenol and bis(4-halophenyl)sulfone only. It should be noted that it is unexpected that each of the compositions of Examples 1-3 should outperform the composition of Comparative Example-2 in light of the performance of the polyethersulfone Comparative Example-1 which comprises structural units derived from bisphenol A and bis(4-halophenyl)sulfone only. It would be expected that the polyethersulfone compositions of Examples 1-3 would exhibit worse, rather than improved performance in the Notched Izod test if the superior Notched Izod performance of Comparative Example-2 is to be attributed to the presence of structural units derived from 4,4'-biphenol and the poor Notched Izod performance of Comparative Example-1 is to be attributed to the presence of structural units derived from bisphenol A. In transitioning from the composition of Comparative Example-2 to the composition of

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Comparative Example-1, it would be expected that replacement of structural units derived from 4,4'-biphenol in Comparative Example-2 with structural units derived from bisphenol A would degrade rather than improve Notched Izod performance of the resulting composition. The data presented for Examples 1-3 reveal exactly (and unexpectedly) the opposite result, namely an improvement in Notched Izod performance as structural units derived from 4,4'-biphenol are replaced with structural units derived from bisphenol A, provided that structural units derived from 4,4'-biphenol are present in an amount greater than 65 mole percent based on all structural units derived from diphenolic monomers. The data provided by Comparative Examples 3-7 confirms the unexpected results obtained for the compositions of Examples 1-3. Comparative Example-3 falls within the required compositional space (i.e. Comparative Example-3 comprises structural units derived from bisphenol-A and greater than 65 mole percent of 4,4'-biphenol based on total moles of diphenolic monomers), but falls outside of the required molecular weight range and hence fails to show the required Notched Izod impact strength value, the composition of Comparative Example-3 having a weight average molecular weight of less than 54,000 grams per mole. Here again, the result is both surprising and unexpected, the difference in molecular weight between the composition of Example 1 and that of Comparative Example-3 is slight, and yet the effect on Notched Izod performance is marked. Comparative Examples 4, 5, 6 and 7 further illustrate the requirement that the polyethersulfone composition of the present invention comprise greater than 65 mole percent of 4,4'-biphenol-derived structural units, and have a weight average molecular weight (M_w) of at least 54,000 grams per mole. The compositions of Comparative Examples 4, 5, 6 and 7 have weight average molecular weights (M_w) of 54,000 grams per mole or higher and yet the Notched Izod performance of these compositions is poor relative to the compositions of Examples 1-3. Again, the difference between the 4,4'-biphenol content of Examples 1-3 and Comparative Examples 4-7 is slight (5-10 mole percent) and yet the effect is pronounced. Comparative Example-6 comprising 65 mole percent structural units derived from 4,4'-biphenol falls just outside of the compositional space of the invention and illustrates the need for greater than 65 mole percent 4,4'-biphenol derived structural units. The composition of Comparative Example-6 exhibited two ranges of impact strength values indicating that

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the test specimens were at the ductile-brittle transition point for this particular composition.

The data provided in Applicants' Table 1 clearly delineate the metes and bounds of the claimed invention. Moreover, compositions falling within the scope of the present invention unexpectedly show enhanced Notched Izod performance characteristics relative to closely related materials falling outside the scope of the present invention. It is to be stressed that the invention is defined by more than just the amounts of structural units derived from 4,4'-biphenol and amounts of structural units derived from bisphenol A present in the composition. The weight average molecular weight of the composition must also be known in order to determine whether or not a particular composition falls within the scope of the Applicants' claimed invention. The Examiner urges that the Cotter reference discloses a compositional range which overlaps the compositional range defining the polyethersulfone compositions of the instant invention. The Applicants respond that their invention cannot be defined by a compositional range alone but requires as an additional limitation that the weight average molecular weight be 54,000 grams per mole or higher. The Cotter reference neither discloses nor suggests the unique polyethersulfone compositions of the instant invention. The Cotter reference, moreover, is silent with respect to the subtle interplay between composition-molecular weight and outstanding impact strength exhibited by the unique polyethersulfone compositions of the instant invention.

In view of the foregoing, the Applicants respectfully request that the rejection of claims 1, 4, 5, 6, 7, 11, 12, 13, 14, 15, 16, 17, and 19 under 35 U.S.C. 103(a) as being unpatenable over the Cotter reference be withdrawn.

Claim 6 was further rejected under 35 U.S.C. 103(a) as being unpatentable over the Cotter reference, in view of US Patent 4,959,454 (hereinafter referred to as "the Fukuyama reference"). In the Applicants' view, claim 1 recites patentable subject matter. Claim 6 is dependent upon claim 1 and therefore of necessity recites patentable subject matter as well. Thus, the Applicants respectfully request that the rejection of claim 6 as

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being unpatentable over the Cotter reference, in view of the Fukuyama reference be withdrawn.

In view of the foregoing amendments and arguments, the Applicants believe that each of claims 1, 4-7, 11-17 and 19 is now in condition for allowance. The Applicants thus courteously solicit a review of the proposed amendment and prompt allowance of these claims. Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact the Applicants' undersigned representative at the telephone number below.

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